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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/523,492	02/03/2005	Andrew E. Feiring	SR0020USPCT	1866

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EXAMINER

HU, HENRY S

ART UNIT	PAPER NUMBER
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1796

MAIL DATE	DELIVERY MODE
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10/18/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/523,492

Applicant(s)

FEIRING ET AL.

Examiner

Henry S. Hu

Art Unit

1796

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on Response of July 26, 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-14 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. This office action is in response to **Amendment** (response only) filed on July 26, 2007. No claim was amended, cancelled or added. **Claims 1-14 are pending now with only one independent claim (Claim 1) since nonelected two groups including Claims 15-33 (Group II) and Claim 34-36 (Group III) have been all cancelled by Applicants on the election of October 27, 2006. **Second non-final office action** is applied after new search. An action follows.**

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

- (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

- 1. Determining the scope and contents of the prior art.
- 2. Ascertaining the differences between the prior art and the claims at issue.
- 3. Resolving the level of ordinary skill in the pertinent art.
- 4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Art Unit: 1796

3. The limitation of parent **Claim 1** in present invention relates to a fluorine-containing copolymer comprising two monomer units including: (A) a repeat unit derived from an ethylenically unsaturated compound having at least one fluorine atom covalently attached to an ethylenically unsaturated carbon atom; and (B) at least a repeat unit derived from an ethylenically unsaturated cyclic compound of structure (I) with a four-membered ring and all factors in a combination are specified as: (a) n is 0, 1, or 2; and (b) R¹, R², R³ and R⁴ are independently from: (b1) H; (b2) C₁₋₁₀ alkyl or alkoxy, optionally substituted by halogen or ether oxygens; or (b3) C₆₋₂₀ aryl. See other limitations of dependent Claims 2-14.

4. **Claims 1-4** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Shepherd** (US 3,810,949), **Sauers et al.** (J. Org. Chemistry, vol. 6, pp. 2175-2181, (1968)), or **Shepherd** (US 4,002,691), each individually in view of **Kobo et al.** (US 5,229,473) and/or **Brasen** (US 2,928,865).

Instant polymer of parent Claim 1 relates to a fluorinated copolymer comprising two repeating units from: (A) at least one fluoroolefin having at least one fluorine atom attaching to double bond and (B) at least one **polycyclic olefin** having a formula of (I) containing a "four"-membered ring.

Regarding parent **Claim 1**, each of three references including **Shepherd (949)**, **Sauers**, or **Shepherd (691)** has individually disclosed the preparation of some polycyclic unsaturated compounds reading on the claimed monomer (b) in parent Claim 1. For instance, see **Sgepherd**

Art Unit: 1796

(949) at column 8, line 37-66 for $-\text{CH}_3$ derivative (only one of R^1 , R^2 , R^3 and R^4 is methyl group); see Sauers at page 2177 at left section for compounds 23 and 24 with all of R^1 , R^2 , R^3 and R^4 being hydrogen atom; see Shepherd (691) at column 2, line 17-24 for $-\text{CH}_2\text{OH}$ derivative (only one of R^1 , R^2 , R^3 and R^4 is nethylol group).

5. Although Sgepherd (949) may disclose such type unsaturated compounds are useful as co-monomer to be copolymerized with other co-monomer(s) such as ethylene (column 18, line 73 – column 19, line 2), each of three references including **Shepherd (949)**, **Sauers**, or **Shepherd (691)** is still silent about specifically using such type unsaturated compound or monomer to be copolymerized with the claimed fluorinated ehylenically unsaturated compound (a).

6. **Kobo and/or Brasen** indeed teaches such a subject matter. The above discussion of the disclosures of the prior art of Kobo or Brasen for Claims 1-4 of previous non-final office action is incorporated here by reference. **Kobo** et al. have disclosed a method for the production of the claimed fluorinated copolymer by using an almost the same monomer (b) (see formula (II) on abstract) except the ring ring size is five or six but not four. **Brasen** has disclosed a method for the production of the claimed fluorinated copolymer by using an almost the same monomer (b) having a four membered ring except the ring substituents (see column 1, line 27-34; also see example 1 at column 4, line 64) are not reading on the claimed monomer (b). According to Kobo or Brasen's disclosure, such type polycyclic unsaturated compound(s) can be readily copolymerized with fluorinated monomer(s) such as tetrafluoroethylene.

Art Unit: 1796

7. In light of the fact that all involving references are dealing with polycyclic monomeric compounds having outer alicyclic ring, one having ordinary skill in the art would therefore have found it obvious to modify and/or extend the use of Shepherd (949), Sauers, or Shepherd (691)'s monomer and/or compound to be copolymerized with fluorinated monomer(s) such as tetrafluoroethylene. One would expect all embodiments in the same genus (ethylene-type monomer) succeed. Additionally, many unique properties from such obtained copolymers may be obtained due to such a modification or extension.

8. Remaining dependent **Claims 2-4** are thereby rejected with the same reason for the above rejection of parent Claim 1.

9. **Claims 5-14** are rejected under 35 U.S.C. 103(a) as being unpatentable over Shepherd (US 3,810,949), Sauers et al. (J. Org. Chemistry, vol. 6, pp. 2175-2181, (1968)), or Shepherd (US 4,002,691), each individually in view of Kobo et al. (US 5,229,473) and/or Brasen (US 2,928,865) as applied to Claim 1, and further in view of **Wheland et al. (US 2003/0215735 A1)**.

The above discussion of the disclosures of the prior art for Claims 1-4 of this office action is incorporated here by reference. Regarding dependent **Claims 5-14**, the references in combination is silent about two things as: (A) further comprising a polar group such as a fluoroalcohol group and/or a protected fluoroalcohol groups (for Claims 5-8 and 14) and (B) further comprising one acid-containing or protected acid-containing structure unit of $(-\text{CH}_2-\text{C}(\text{E}_1)(\text{E}_2)-)$ such as tertiary-butyl acrylate (for Claims 9-13).

On one hand, **Wheland et al. have taught limitation (A) for Claims 5-8 and 14** by attaching a fluorinated alcoholic group such as $-C(R_f)(R_f)-OH$ (which is treated as an acid as known in the art) and the like as well as its protected substituents onto the monomer (paragraphs 0063-0067 and 0079).

On the other hand, **Wheland et al. have taught limitation (B) for Claims 9-13** by adding additional monomer which is acid-containing or protected acid-containing for copolymerization use. For instance, tertiary-alkyl acrylates or tertiary-alkyl methacrylates can be included (paragraph 0068). By doing so, photoacid group can be generated for catalysis upon imagewise exposure for resist formation (paragraphs 0063-0064; also see abstract, line 1-12; paragraphs 0003-0008).

10. Therefore, the skill artisan would make the obvious connection to further add the claimed fluoroalcohol or protected fluoroalcohol groups on somewhere in the cyclic alkenes as well as to add acid-containing or protected acid-containing monomer such as tertiary-alkyl acrylates or tertiary-alkyl methacrylates for copolymerization so as to prepare the claimed copolymers useful as a photoresist. By doing so, photoacid group can be readily and conveniently generated in situ for catalysis upon imagewise exposure

Conclusion

Art Unit: 1796

11. Any inquiry concerning this communication or earlier communication from the examiner should be directed to **Dr. Henry S. Hu whose telephone number is (571) 272-1103**. The examiner can be reached on Monday through Friday from 9:00 AM – 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vasu Jagannathan, can be reached on (571) 272-1119. The fax number for the organization where this application or proceeding is assigned is **(571) 273-8300** for all regular communications. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


Henry S. Hu

Patent Examiner, Art Unit 1796, USPTO

October 14, 2007

/Peter D. Mulcahy/
Peter D. Mulcahy
Primary Examiner
Art Unit 1796